

WE CLAIM:

1. An apparatus for utilizing a focused beam of charged particles, comprising:
  - means for producing a beam of charged particles directed toward a target,
  - means for controlling said beam to form an envelope of predetermined configuration having at least one crossover point, and
  - a filter means through which said beam passes, wherein said means for controlling the beam positions said crossover point within said filter means.
2. The apparatus of Claim 1, wherein said filter means is a Wien filter.
3. The apparatus of Claim 2, wherein said beam has an axis, and wherein said controlling means positions said crossover point substantially on said beam axis.
4. The apparatus of claim 3, wherein said filter means has an axis in substantial alignment with said beam axis.
5. The apparatus of Claim 2, wherein said beam has an axis, wherein said beam passes through said filter means over a given axial distance, and wherein said controlling means positions said crossover point within a vertically lower half of said axial distance.
6. The apparatus of claim 5, wherein said filter means has an axis in substantial alignment with said beam axis.
7. The apparatus of Claim 2, wherein said beam has an axis, wherein said beam passes through said filter means over a given axial distance, and wherein

said controlling means positions said crossover point near a mid-point of said axial distance.

8. The apparatus of claim 7, wherein said filter means has an axis in substantial alignment with said beam axis.

9. The apparatus of Claim 2, wherein said beam has an axis, wherein said beam passes through said filter means over a given axial distance, and wherein said controlling means positions said crossover point substantially on said axis and near the mid-point of said axial distance.

10. The apparatus of claim 9, wherein said filter means has an axis in substantial alignment with said beam axis.

11. The apparatus of Claim 1, wherein said controlling means controls said beam envelope to have a second crossover point between said beam producing means and said filter means.

12. The apparatus of Claim 11, wherein said beam has an axis, and wherein said second crossover point is substantially on said beam axis.

13. An apparatus for utilizing focused beams of charged particles, comprising:

a target,

a particle source directing a beam of the particles to travel from said source to said target and forming a beam envelope,

a Wien filter through which said beam passes,

an objective lens through which said beam passes, and located between said

Wien filter and said target,

at least one deflector between said particle source and said Wien filter through which said beam passes and effective to produce in said envelope a beam crossover point within said Wien filter.

14. The apparatus of Claim 13, wherein said deflector comprises at least one lens.

15. The apparatus of Claim 14, wherein said beam has an axis, and wherein said deflector positions said crossover point substantially on said beam axis.

16. The apparatus of claim 15, wherein said Wien filter has an axis in substantial alignment with said beam axis.

17. The apparatus of Claim 14, wherein said beam has an axis, wherein said beam passes through said Wien filter over a given axial distance, and wherein said deflector positions said crossover point within a vertically lower half of said axial distance.

18. The apparatus of claim 17, wherein said Wien filter has an axis in substantial alignment with said beam axis.

19. The apparatus of Claim 14, wherein said beam has an axis, wherein said beam passes through said Wien filter over a given axial distance, and wherein said deflector positions said crossover point near a mid-point of said axial distance.

20. The apparatus of claim 19, wherein said Wien filter has an axis in

substantial alignment with said beam axis.

21. The apparatus of Claim 14, wherein said beam has an axis, wherein said beam passes through said Wien filter over a given axial distance, and wherein said deflector positions said crossover point substantially on said axis and near the mid-point of said axial distance.

22. The apparatus of claim 21, wherein said Wien filter has an axis in substantial alignment with said beam axis.

23. The apparatus of Claim 13, wherein said deflector controls said beam envelope to have a second crossover point between said particle source and said Wien filter.

24. The apparatus of Claim 23, wherein said beam has an axis, and wherein said second crossover point is substantially on said beam axis.

25. The apparatus of Claim 13, further comprising an aperture through which said beam passes, wherein said envelope also has a crossover point in the vicinity of said aperture.

26. A method for imaging a target utilizing a focused beam of charged particles, comprising:

- producing a beam of charged particles with a beam producing means,
- directing said beam toward the target,
- providing a filter through which said beam passes,
- controlling said beam to form an envelope of predetermined configuration having at least one crossover point, and

positioning said crossover point within said filter.

27. The method of Claim 26, wherein said beam has an axis, and wherein said filter is a Wien filter having an axis in substantial alignment with said beam axis.

28. The method of Claim 27, wherein said crossover point is positioned substantially on said beam axis.

29. The method of Claim 26, wherein said beam passes through said filter over a given axial distance, and wherein said crossover point is positioned within a vertically lower half of said axial distance.

30. The method of Claim 26, wherein said beam passes through said filter over a given axial distance, and wherein said crossover point is positioned near a mid-point of said axial distance.

31. The method of Claim 26, wherein said beam passes through said filter over a given axial distance, and wherein said crossover point is positioned substantially on said axis and near the mid-point of said axial distance.

32. The method of Claim 25, wherein said beam envelope is controlled to have a second crossover point between said beam producing means and said filter.

33. The method of Claim 32, wherein said beam has an axis, and wherein said second crossover point is positioned substantially on said beam axis.

34. The method of Claim 32, further comprising the step of providing an

